

REMARKS

Claims 1-25 have been cancelled.

Claims 26-48 have been added. Thus, the pending claims are new claims 26-48.

Newly added claims correspond substantially to cancelled claims 1-25. These claims have been rewritten to recite a “rubber composition,” in place of “copolymer” as a component of a rubber composition. Support for the new claims is found in the specification and claims as originally filed. Thus, there is no new matter added as a consequence of the addition of the new claims.

New claim 26 corresponds substantially to cancelled claim 1. In addition, claim 26 has been rewritten to incorporate the following limitation, “each of said blocks comprising an essentially unsaturated diene elastomer.” Support for this limitation can be found at pages 5, para. [0020] and 6, para. [0025-0026].

The present invention

The present invention relates to a rubber composition which exhibits improved processability in the uncrosslinked state and reduced hysteresis in the crosslinked state. The rubber composition defined by new claim 26 comprises an elastomeric matrix, which comprises a block copolymer. Each of the blocks comprises an essentially unsaturated diene elastomer having a molar content of units originating from conjugated dienes of greater than 15% (page 5, para. [0020]; page 6, para. [0025-0026]). The unsaturation of the elastomeric block is a crucial element which, in combination with specific ranges of number-average molecular weights  $M_{n1}$  of said or each polyisoprene end block and  $M_{n2}$  of the block other than said or each polyisoprene end block, imparts to the rubber composition of the present

invention the characteristics of improved processability in the uncross-linked state and a reduced hysteresis in the cross-linked state.

35 U.S.C. §102 Rejection

The Examiner has rejected claims 1-2, 4-6, and 13 under 35 U.S.C. §102 as being anticipated by Coolbaugh et al. (US 5,457,161). The Examiner alleges that Coolbaugh et al. discloses a triblock copolymer having a structure of  $(I)_x-(B)_y-(I)_x$ , wherein the I blocks are polyisoprene and B block is polybutadiene. The Examiner alleges that Coolbaugh et al. discloses (1) the molecular weight of the polyisoprene blocks and the polybutadiene blocks within the range specified in claim 1, (2) the polybutadiene block as specified in claim 13, (3) that each block comprises a diene elastomer wherein a molar content of units of the polymerizable isoprene and butadiene is greater than 15% because each block can be derived from polyisoprene and polybutadiene as specified in claim 1, (4) that the blocks can be functionalized as specified in claim 5, and (5) that the block copolymer can be compounded with silica and vulcanizing agents as specified in claims 5-6. The applicants respectfully disagree.

As indicated in the Remarks section, claims 1-25 have been cancelled and replaced with new claims 26-48. Thus, the comments to the 102 rejection will be addressed in regard to new independent claim 26.

For a claim to be anticipated by a reference, "there must be no difference between the claimed invention and the reference disclosure, as viewed by a person of ordinary skill in the field of the invention." *Scripps Clinic & Research Foundation v. Genentech, Inc.*, 927 F.2d 1565 18 U.S.P.Q.2d 1001 (Fed. Cir. 1991). Moreover, a claim is anticipated and fails to meet the requirement of §102 only when a single prior art reference discloses each and every

element of the claimed invention. *Lewmar Marine, Inc. v. Bariant*, 3 U.S.P.Q.2d 1766 (Fed. Cir. 1987), emphasis added.

In contrast to the present invention, Coolbaugh et al. concerns an elastomeric polymer block having a substantially saturated backbone with only unsaturation in the terminal blocks (Abstract; col. 1, lines 23-32; col. 4, lines 57-63). The copolymer block comprises at least one triblock having the formula, I-B-I. In fact, the saturation imparts oxidation and thermal stability to the claimed composition (col., lines 54-57; col. 28, lines 28-31). To prepare the elastomeric copolymer of Coolbaugh et al., the B block is selectively hydrogenated after polymerization so that it contains “substantially none of the original unsaturation, while each of the blocks I retains a sufficient amount of its original unsaturation to cure (or vulcanize) the block copolymer (col. 4, lines 57-62).

Furthermore, one of skill in the art would not consider subjecting the present composition to a hydrogenation reaction. Such a reaction would produce a saturated chain, which is in contrast to the presently claimed invention. Hydrogenation of a triblock, I-B-I copolymer would lead to an undesirable thermoplastic material, because the butadiene fraction forms a crystalline polyethylene.

Coolbaugh et al. does not teach a crosslinkable or crosslinked rubber composition comprising an elastomeric matrix, wherein said elastomeric matrix comprises a block copolymer having blocks that comprise essentially unsaturated diene elastomers. In fact, since Coolbaugh et al. emphasizes the teaching of a rubber composition having a selectively hydrogenated block polymer whose central block is saturated, Coolbaugh et al. actually teaches away from the presently claimed invention.

Because it does not teach each and every element of new claim 26, Coolbaugh et al. cannot anticipate newly added claims 26-48 of the present invention. Thus, applicants submit that any 102 rejections over new claims 26-48 would be improper.

35 U.S.C. §103(a) Rejection

The Examiner has rejected claims 1-25 under 35 U.S.C 103(a) as being unpatentable over Coolbaugh et al (US 5,457,161) in view of Rauline (US 5,227,425). The Examiner alleges that Coolbaugh et al. does not disclose a functional group comprising a silanol group for claim 7, nor a trialkoxysilane for claim 8, nor a tire tread. The Examiner contends that Rauline discloses a sulfur vulcanizable rubber composition for manufacturing a tire tread, wherein the rubber composition comprises a reinforcing filler such as silica and a silica coupling agent such as 3-chloropropyl-triethoxysilane. The Examiner further contends that 3-chloropropyl-triethoxysilane is readable as a trialkoxysilane. In addition, the Examiner contends that Rauline discloses a rubber composition comprising a copolymer of a conjugated diene with at least one other diene elastomer. The Examiner alleges that it would have been obvious to one of ordinary skill in the art to employ a functional agent such as 3-chloropropyl-triethoxysilane as disclosed in Rauline into an elastomeric block copolymer of Coolbaugh et al. for the purposes of being a functional agent. Further, the Examiner alleges that it would have been obvious to one of ordinary skill in the art to use an elastomeric block of Coolbaugh et al. for manufacturing a tire tread as suggested by Rauline, because the elastomeric block copolymer can be used as other diene elastomer for formulation of a rubber composition for a tire tread.

The applicants respectfully traverse the rejection.

To establish a *prima facie* case of obviousness, three basic criteria must be met (MPEP 2142). First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art to modify the reference or to combine the teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and not based on applicant's disclosure. *In re Vaeck* 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1981). In addition, the prior art reference(s) must teach or suggest all the claim limitations. Both the suggestion and a reasonable expectation of success must be present in the references themselves.

As stated above, Coolbaugh et al. teaches an elastomeric polymer block having a substantially saturated backbone with limited unsaturation found only in the terminal blocks. Coolbaugh et al. does not teach a crosslinkable or crosslinked rubber composition comprising an elastomeric matrix, wherein said elastomeric matrix comprises a block copolymer having blocks that comprise essentially unsaturated diene elastomers. In addition, Coolbaugh et al. teaches away from the use of unsaturated elastomers due to the instability of oxidative and thermal effects exhibited by their use. Upon a reading of Coolbaugh et al., one of skill in the art would not be motivated to use unsaturated diene elastomers in the block copolymer.

Rauline relates to a vulcanizable rubber composition comprising a copolymer of a conjugated diene and an aromatic vinyl compound, and silica. Rauline also does not disclose a crosslinkable or crosslinked rubber composition comprising an elastomeric matrix, wherein said elastomeric matrix comprises a block copolymer having blocks that comprise essentially unsaturated diene elastomers.

The cited art, alone or in combination, do not disclose a cross-linkable or cross-linked rubber composition comprising an elastomeric matrix, wherein said elastomeric matrix comprises a block copolymer having  $n$  blocks, each of said blocks comprising an essentially unsaturated diene elastomer. Thus, the cited art fails to teach or suggest all claim limitations.

Since Coolbaugh et al. clearly teaches away from the use of unsaturated diene elastomers in the elastomeric matrix, one of ordinary skill in the art would not be motivated to modify Coolbaugh et al. to arrive at the present invention.

As a result, applicants respectfully submit that new claims 26-48 are patentable over Coolbaugh et al. in view of Rauline.

#### 35 U.S.C. §112 Rejection

The Examiner has rejected claims 1 and 2 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the applicant regards as the invention. Specifically, the Examiner alleges that  $M_{n2}$  should be replaced with  $M_{n1}$  in claim 1 and  $M_n/M_{n2}$  should be replaced with  $M_{n1}/M_{n2}$  in claim 2.

Applicants believe that the Examiner is in error regarding the designations of the molecular weights of the polyisoprene blocks and submit that the designations in claims 1 and 2 are correct. In claim 1, line 9,  $M_{n2}$  refers to the number-average molecular weight of the block of the copolymer that is any block other than the polyisoprene end blocks. Support for this limitation is found at page 5, para. [0020], page 6, para. [0026], and the Abstract. In contrast,  $M_{n1}$  refers to the number-average molecular weight of the polyisoprene end blocks (page 5, para. [0020]; page 6, para. [0026]; the Abstract). In addition, claim 1 did not recite

$M_n/M_{n2}$ , rather line 2 of claim 2 correctly recites  $M_{n1} / M_{n2}$ . Recitation of the number-average molecular weights,  $M_{n1}$  and  $M_{n2}$ , in new claims 26 and 27 are the same as recited in cancelled claims 1 and 2.

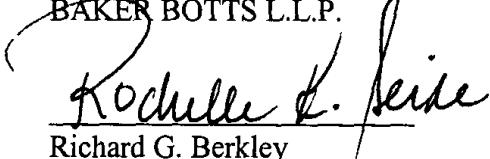
CONCLUSION

Based on the foregoing amendments and remarks, applicants submit that the present application is in condition for allowance. A Notice of Allowance is respectfully requested. Applicants request a two month extension of time and enclose herewith the required fee pursuant to 37 C.F.R. § 1.17(a)(2).

The Commissioner is hereby authorized to charge payment of any additional fees associated with this communication to Deposit Account No. 02-4377. Duplicate copies of this page are enclosed.

Respectfully submitted,

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